(d) The thermal receptivity and mass of the substance to which heat is imparted ;
(e) The temperature differential established;
(/) The velocity of flow of the gases;
(g) The pressure in the combustion chamber.

The accompanying curves show the. possibilities, as regards heat transfer, of the respective combustibles when burned with various amounts of excess air and various amounts of preheat for the air and the fuel, when this latter does not contain hydrocarbons dissociated by preheating. The chemical composition of these combustibles is given in Table 6. In the case of the liquid and pulverized fuels the amount of air or steam required for atomizing purposes is given in the caption of the curve. One of the interesting facts revealed is that the use of steam instead of air for atomizing oil results in reducing the temperature obtainable by 170° C. (306° F.). This is due to the fact that the same amount of air is required in both cases, and the steam merely increases the volume and weight of the products of combustion.
At the same time it may be that it is much more economical to use the steam directly in the atomizing instead of indirectly in compressing the air for atomizing. A steam jet is notoriously inefficient.
In a marine installation where space and weight have to be considered, a Great Lakes boat would use a steam jet floating in her boiler feed supply. On salt water, where boiler make-up is obtained by evaporation, an air compressor would exhaust to the condenser and evaporator capacity would be saved or the air blast fans would be run by motors. Steam jets would increase evaporator capacity and heat consumption. *Mechanical atomizing will avoid fans or compressors but will necessitate the use of oil heaters and the pumps necessary to create the oil pressure required for the spray nozzles.* Assuming a 20 per cent excess

air supply, the comparison on p. 352 can be made from the curves. While the difference in favor of air atomizing is only 1 per cent of the heat released it is available in producing steam at boiler efficiency, from 1 to 9 per cent of the steam generated will be used in atomizing. The oil will evaporate from 11 to 14 times its weight of water. With air atomizing the temperature in the firebox will approximate 1885° C. (3280° F.) and with steam 1710° C. (3110° F.). The actual temperature realized will be about 100° C. or 200°